ENGINEERING CHANGE PROPOSAL, PAGE 1
(SEE MIL-STD-480 FOR INSTRUCTIONS).

DATE PREPARED: November 1990

PROCURING ACTIVITY NO

1. ORIGINATOR NAME AND ADDRESS	2 CLASS OF ECP	3. JUST CODE	4. PRIORITY
GE Astro-Space Division P.O. Box 800 Princeton, N J 08543-0800	I	U	I U

5. ECP DESIGNATION

a. MODEL/TYPE	b. MFR. CODE	c. SYSTEM DESIG.	d. ECP NO.	e. TYPE	f. REV.	g. CORR.
Block 5D-3	49671	DMSP	71R1	F	1	N/A

6 BASELINE AFFECTED: ☐ FUNCTIONAL ☐ ALLOCATED ☐ PRODUCT

7. OTHER SYSTEM / CONFIG ITEMS AFFECTED: ☒ YES ☐ NO

8 SPECIFICATIONS AFFECTED . TEST PLAN / 9. DRAWINGS AFFECTED

	MFR CODE	SPECIFICATION / DOCUMENT NO	SCN	MFR CODE	NUMBER	REV	FOR HO
a. SYSTEM		See Attach. 1-5.			N/A		
b. ITEM		See Enclosure 1.			N/A		
c. TEST PLAN		N/A			N/A		

10. TITLE OF CHANGE

Realtime Data Smooth Implementation

11. CONTRACT NO & LINE ITEM

F04701-89-C-0029

12 CONFIGURATION ITEM NOMENCLATURE

DMSP Block 5D-3 Spacecraft S16 through S20

13 IN PRODUCTION: ☒ YES ☐ NO

14 NAME Of PART OR LOWEST ASSEMBLY AFFECTED

Spacecraft

15 PART NO OR NPE DESIGNATION

N / A

16 DESCRIPTION OF CHANGE

incorporate the capability for transmission of encrypted Realtime Data Smooth (RDS) at 88 Kbps at an S-Band carrier frequency for S16 and at both S-band and UHF carrier frequencies for S17-S20. See Enclosure 1.

17 NEED FOR CHANGE

To provide Operational Linescan System smooth data which is receivable by small tactical ground terminals.

16 PRODUCTION EFFECTIVITY BY SERIAL NUMBER

S16, S17, S18, S19, S20

19 EFFECT ON PRODUCTION DELIVERY SCHEDULE

20 RETROFIT

a. RECOMMENDED ITEM EFFECTIVITY	c. SHIP / VEHICLE CLASS AFFECTED
N/A	N/A
b ESTIMATED KIT DELIVERY SCHEDULE	d LOCATIONS OF SHIP / VEHICLE NUMBERS AFFECTED
N/A	N/A

21 ESTIMATED COSTS/SAVINGS UNDER CONTRACT

N/A

22. ESTIMATED NET TOTAL COSTS

See Cost Proposal No. 104094-E, Rev 1

23. SUBMITTING ACTIVITY AUTHORIZING SIGNATURE

TITLE: Block 5D-3 S16-S20 Program Manager

24 APPROVAL / DISAPPROVAL

	b CLASS II				
☐ APPROVAL RECOMMENDED	☐ APPROVED	☐ DISAPPROVED	☐ CONCUR N CLASSIF-ICATION OF CHANGE		☐ DO NOT CONCUR IN CLASSIFICATION OF CHANGE
c GOVERNMENT ACTIVITY		SIGNATURE			DATE

DD FORM 1692 1 DEC 68

ORIGINATOR NAME AND ADDRESS		ECP NUMBER
	GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	71R1

EFFECTS OF FUNCTIONAL! ALLOCATED CONFIGURATION IDENTIFICATION

25 OTHER SYSTEMS AFFECTED	**26** OTHER CONTRACTORS /**ACTIVITIES** AFFECTED
None	Westinghouse, Harris

27 CONFIGURATION ITEMS AFFECTED

DMSP 5D-3 Spacecrafts S16 through S20

2.9 EFFECTS ON PERFORMANCE ALLOCATIONS AND INTERFACES IN SYSTEM SPECIFICATIONS

None

29 EFFECTS ON EMPLOYMENT INTEGRATED LOGISTIC SUPPORT. TRAINING. OPERATIONAL EFFECTIVENESS, ETC

None

30 EFFECTS ON CONFGURATION ITEM SPECIFICATIONS

As shown in SCN 003 to S-DMSP-895-1, SCN 003 to S-DMSP-895-2, SCN 003 to
S-DMSP-895-3, SCN 003 to DMSP-895-4, and SCN 003 to S-DMSP-895-5, included
as Attachments 1, 2, 3, 4, and 5, respectively.

31 DEVELOPMENTAL REQUIREMENTS AND STATUS

Definition of the desired S-band and UHF carrier frequencies and definition
of the GFE encryption unit interface requirements must be established by
or before the Preliminary Design Review (1 June 1991).

32 TRADE OFFS AND ALTERNATIVE SOLUTIONS

Tradeoffs associated with the implementation of Realtime Data Smooth are
documented in _OLS Realtime Data Smooth Transmission to Small Tactical
Terminals Study Final Technical Operating Report_, issued November 9389.

33 DATE BY WHICH CONTRACTUAL AUTHORITY IS NEEDED   1 December 1990

DD 1 DEC 68 **1692 - 1**

	PROCURING ACTIVITY NO

ORIGINATOR NAME AND ADDRESS	GE Astro-Space Division P.O. Box 800 Princeton, N J 08543-0800	ECP NUMBER 71R1

EFFECTS ON PRODUCT CONFIGURATION IDENTIFICATION, OPERATION AND LOGISTICS

(X)	FACTOR	ENCL.	PAR.	(X)	FACTOR	ENCL.	PAR.
▓	34. EFFECT ON PROD. CONFIG. IDENT OR CONTRACT N/A	▓	▓				
	PERFORMANCE						
	WEIGHT-BALANCE-STABILITY *(Aircraft)*			▓	36. EFFECT ON OPERATIONAL EMPLOYMENT N/A	▓	▓
	WEIGHT-MOMENT *(Other equipment)*				SAFETY		
	DRAWINGS				SURVIVABILITY		
	NOMENCLATURE				RELIABILITY		
					MAINTAINABILITY		
					SERVICE LIFE		
▓	35. EFFECT ON INTEG LOGISTIC SUPPORT ELEMENTS N/A	▓	▓		OPERATING PROCEDURES		
	ILS PLANS				ELECTROMAGNETIC INTERFERENCE		
	MAINTENANCE CONCEPT AND PLANS				ACTIVATION SCHEDULE		
	MAINTENANCE PROCEDURES				OPERATING INSTALLATIONS		
	INTERIM SUPPORT PROCEDURES						
	SPARES AND REPAIR PARTS						
	TECHNICAL MANUALS/PROGRAMMING TAPES			▓	37. OTHER CONSIDERATIONS	▓	▓
	FACILITIES			X	INTERFACE	Atch. 1-5	
	SUPPORT EQUIPMENT				OTHER AFFECTED EQUIPMENT/GFE		
	OPERATOR TRAINING				PHYSICAL CONSTRAINT		
	OPERATOR TRAINING EQUIPMENT				OPERATIONAL COMPUTER PROGRAMS		
	MAINTENANCE TRAINING				REWORK OF OTHER EQUIPMENT		
	MAINTENANCE TRAINING EQUIPMENT			X	SYSTEM TEST PROCEDURES	Encl. 1	
	PERSONNEL						
	CONTRACT ENGINEERING TECHNICAL SERVICES						
	VERIFICATION AND DEMONSTRATION PLANS						

38 ALTERNATNE SOLUTIONS

Alternative solutions are described in <u>OLS Realtime Data Smooth Transmission</u>
<u>toSmall Tactica1 Terminals Study FinalTechnical Oprating Report</u>, issued
November 1989.

39 DEVELOPMENTAL STATUS

In production_

40 RECOMMENDATIONS FOR RETROFIT

N/A

41 MAN-HOURS PER UNIT TO INSTALL RETROFIT KITS				42 MAN-HOURS TO CONDUCT SYSTEM TESTS AFTER RETROFIT
a. ORGANIZATION	**b. INTERMEDIATE**	**c. DEPOT**	**d OTHER**	
N/A	N/A	N/A	N/A	N/A

43 THIS CHANGE MUST BE ACCOMPLISHED	44 IS CONTR. FIELD SERVICE ENG REQUIRED?	45 OUT OF SERVICE TIME
☐ BEFORE ☐ WITH ☐ AFTER THE FOLLOWING CHANGES N/A	☐ YES ⊠ NO	N/A

EFFECT OF THIS ECP AND PREVIOUSLY APPROVED ECPS ON ITEM	47 DATE CONTRACTUAL AUTHORITY NEEDED FOR
N/A	PRODUCTION ___ 01 December 1990 ILS ___ N/A

DD _{1 DEC 68} FORM **1692 - 2**

ENGINEERING CHANGE PROPOSAL, PAGE 4
(SEE MIL-STD-480 FOR INSTRUCTIONS)

PROCURING ACTIVITY NO

| ORIGINATOR NAME AND ADDRESS | GE Astro-Space Division
P.O. Box 800
Princeton, N J 08543-0800 | ECP NUMBER
71R1 |

48. ESTIMATED NET TOTAL COST IMPACT (USE MINUS SIGN FOR SAVINGS)

SEE GE COST PROPOSAL

104094-E, Rev. 1

ENGINEERING CHANGE PROPOSAL, PAGE 5
(SEE MIL-STD-480 FOR INSTRUCTIONS)

PROCURING ACTIVITY NO

ORIGINATOR NAME AND ADDRESS	ECP NUMBER
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	71R1

49. ESTIMATED COSTS /SAVINGS SUMMARY, RELATED ECP'S (USE MINUS SIGN FOR SAVINGS)

SEE GE COST PROPOSAL

104094-E, Rev. 1

DD 1 DEC 68 FORM 1692-4

ENGINEERING CHANGE PROPOSAL, PAGE 6
(SEE MIL-STD-480 FOR INSTRUCTIONS)

DATE PREPARED

PROCURING ACTIVITY NO

1November 1990

ORIGINATOR NAME AND ADDRESS	MFG CODE	ECP NUMBER
GE Astro-Space Division P.O. Box 800 Princeton, N J 08543-0800	49671	71R1

CONFIGURATION ITEM NOMENCLATURE	TITLE OF CHANGE
DMSP Block 5D-3 Spacecraft S16-S20	Realtime Data Smooth Implementation (S16-S20)

SEE ATTACHED SCHEDULE

DD 1 FORM DEC 68 1692 - 5

Real-Time Data Sh... Implementation Schedule (S16-S20)

Task	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Contract Milestones RDS Reviews		ATP △ 12/90	PDR △ 6/91	CDR △ 12/91						
GFE Delivery Dates			S16 △ 8/92	S17 △ 8/93	S18 △ 8/94	S19 △ 8/95	S20 △ 8/96			
Present Contract S/C Delivery Dates					S16 △ 3/94	S17 △ 3/95	S18 △ 3/96	S19 △ 3/97	S20 △ 3/98	
RDS Design Effort		△ 12/90 —— △ 12/90								
Long Lead Parts Procurement		mwave OSC (xmtrs), transistors (PIP); △ 7/91 —— △	△ 1/93 CMOS (PIP)							
Transmitter FA&T (S-Band & UHF)		START - 7/92	△ △ △ S16 QUAL	△ S17	△ S18	△ S19	△ S20	S16 (UHF KIT)		
PIP FA&T (S16 and S17)		◢▨▨▨▨▨ xsistors avail. ▨▨▨ —— △								
PIP FA&T (S18, S19, and S20)		◢▨▨▨▨▨▨▨▨▨▨ —— △								
Start S16 Integration			CMOS avail. △—△ (Hold for flight PIP) 7/92 11/92							
Flight PIPs Available				△ △ 2/93 5/93	△ △ △ 10/93 1/94 4/94					
Resume S16 Integration				△ 3/93 ——	△ 3/94					
S17 Integration				△—△	3/94 △ ——	△ 4/95				
S18 Integration					△—△ 1/95 △ ——	△ 2/96				
S19 Integration					△—△	2/96 △ ——	△ 3/97			
S20 Integration						△—△	3/97 △ ——	△ 4/98		
Revised Contract S/C Delivery Dates					7/24/94 △ S16	8/13/95 △ S17	8/17/96 △ S18	8/21/97 △ S19	8/25/98 △ S20	

ENCLOSURE 1

BLOCK 8. SPECIFICATIONS AFFECTED

BLOCK 16. DESCRIPTION OF CHANGE

ENCLOSURE 1

BLOCK 8.   SPECIFICATIONS AFFECTED

1.   Prime Item Development Specification Addendum S-DMSP-895-1 is
     affected. This specification should be revised in accordance
     with SCN-003, dated 1 November 1990, included with this ECP as
     Attachment 1.

2.   Prime Item Development Specification Addendum S-DMSP-895-2 is
     affected. This specification should be revised in accordance
     with SCN-003, dated 1 November 1990, included with this ECP as
     Attachment 2.

3.   Prime Item Development Specification Addendum S-DMSP-895-3 is
     affected. This specification should be revised in accordance
     with SCN-003, dated 1 November 1990, included with this ECP as
     Attachment 3.

4.   Prime Item Development Specification Addendum S-DMSP-895-4 is
     affected. This specification should be revised in accordance
     with SCN-003, dated 1 November 1990, included with this ECP as
     Attachment 4.

5.   Prime Item Development Specification Addendum S-DMSP-895-5 is
     affected. This specification should be revised in accordance
     with SCN-003, dated 1 November 1990, included with this ECP as
     Attachment 5.

BLOCK 8.   SPECIFICATIONS AFFECTED (continued)

6.   Statement of Work for Contract FO4701-89-C-0029 is affected.
     This statement of work should be revised in accordance with the
     proposed changes, dated 1 November 1990, included with this ECP
     as Attachment 6.

BLOCK 16.   DESCRIPTION OF CHANGE

16.1 **Background**

In 1989, General Electric Astro-Space Division cooperated with
Westinghouse and Harris on a study to investigate and recommend
modifications to the current DMSP system to provide Operational
Linescan System (OLS) imagery and mission sensor data to small
tactical receivers. The study results can be found in <u>OLS Realtime
Data Smooth Transmission to Small Tactical Terminals Study Final
Technical Operating Report</u>, issued November 1989. Four design
approaches were investigated during the study. This proposal
includes the spacecraft bus modifications necessary for
implementation of the S-band design approach on S16 and the Hybrid
S-band/UHF design approach on S17-S20 (Sections 6.2.1 and 6.2.3,
respectively, of the aforementioned document). Redundancy of the
S-band link will be accomplished through utilization of one of the
present data links (PDT-1, PDT-2, or the DDT).

16.2 **Introduction**

The spacecraft Communications Subsystem currently incorporates
three S-band mission data links, each enabled separately, and each
including a transmitter and a directional antenna. Data from both
the primary and mission sensors are accumulated and formatted by
the OLS and supplied, together with other ancillary data (such as
earth location data), to Primary Data Transmitter 1 (PDT-1),
Primary Data Transmitter 2 (PDT-2), and the Direct Data
Transmitter (DDT) as a digital NRZ-L bit stream at 1.024, 1.3312,

or 2.6624 Mbps. Three directional antennas, each tuned to one of the three S-band carrier frequencies, are located on the earth-facing (+X) side of the spacecraft. Each provides a ±62° cone radiation pattern around the spacecraft +X axis.

The OLS currently provides three data formats: Stored Data Smooth (SDS), Stored Data Fine (SDF), and Real Time Data (RTD). The digital data format that will be used for Realtime Data Smooth (RDS) will be identical to the SDS data format; however, the Realtime Data Smooth will be in NRZ-M format and will incorporate forward error correction.

A new S-band communication link is proposed for transmission of the Realtime Data Smooth data on S16, and a new hybrid S-band and UHF communication link is proposed for transmission of the Realtime Data Smooth data on S17-S20. The objective is to furnish the RDS data to S-band and UHF tactical receiving systems simultaneously. S-band receivers are more resistant to jamming, whereas UHF receivers, employing omnidirectional antennas, are easier to set up.

16.3 Spacecraft Design Modifications

16.3.1 Communications Subsystem

The RDS data will be routed to an S-band transmitter on S16, as shown in Figure 16.3.1-1, and to both an S-band transmitter and also a pair of redundant UHF transmitters on S17-S20, as shown in Figure 16.3.1-2. The output of the selected UHF transmitter of each pair will be coupled through an RF switch to an antenna

16.3.1.1 S-band Transmitter

The S-band transmitter will be identical to the present mission data transmitters and will operate at an output power of 5.5W. The microwave oscillator design presently used can be adapted for an
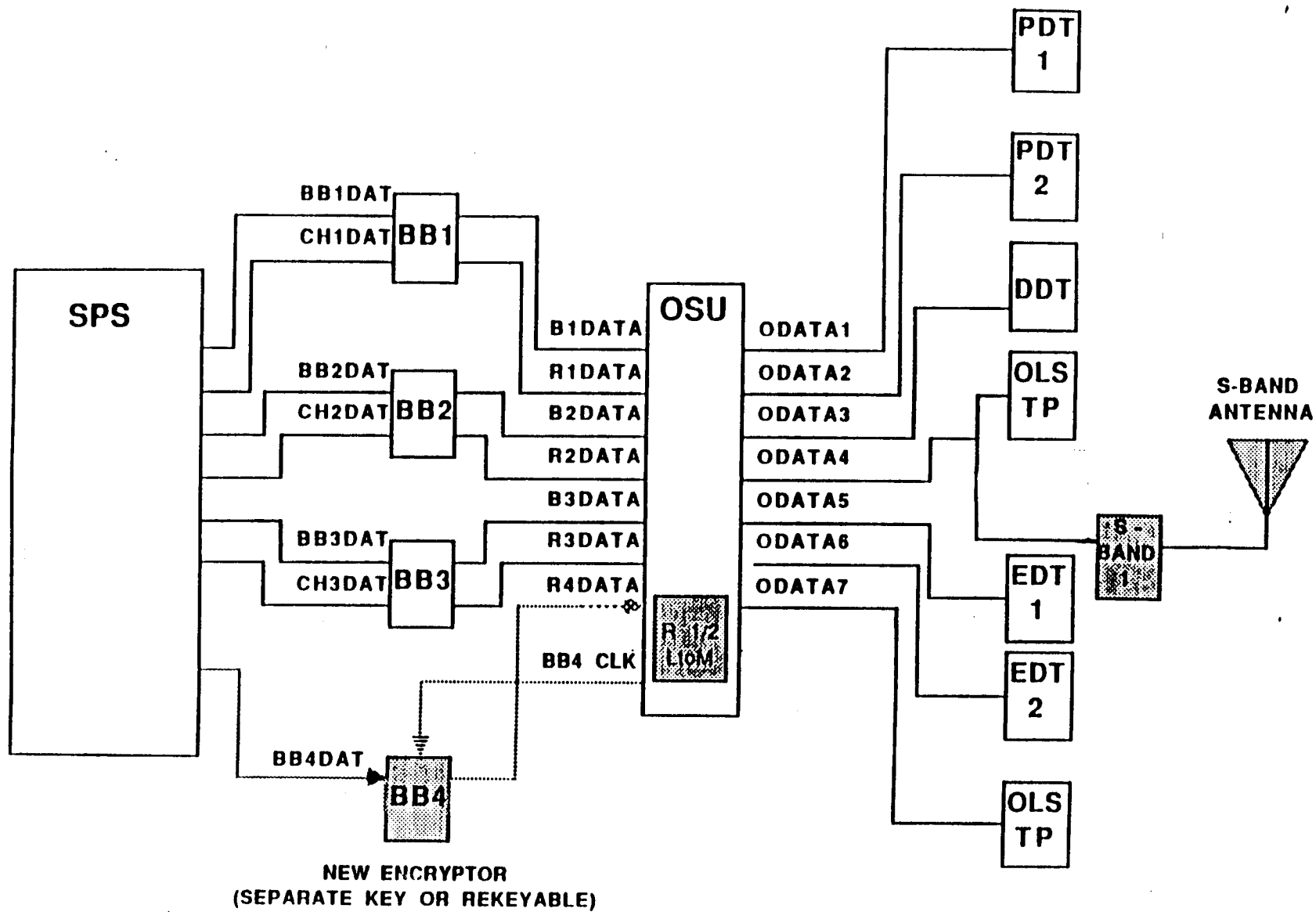
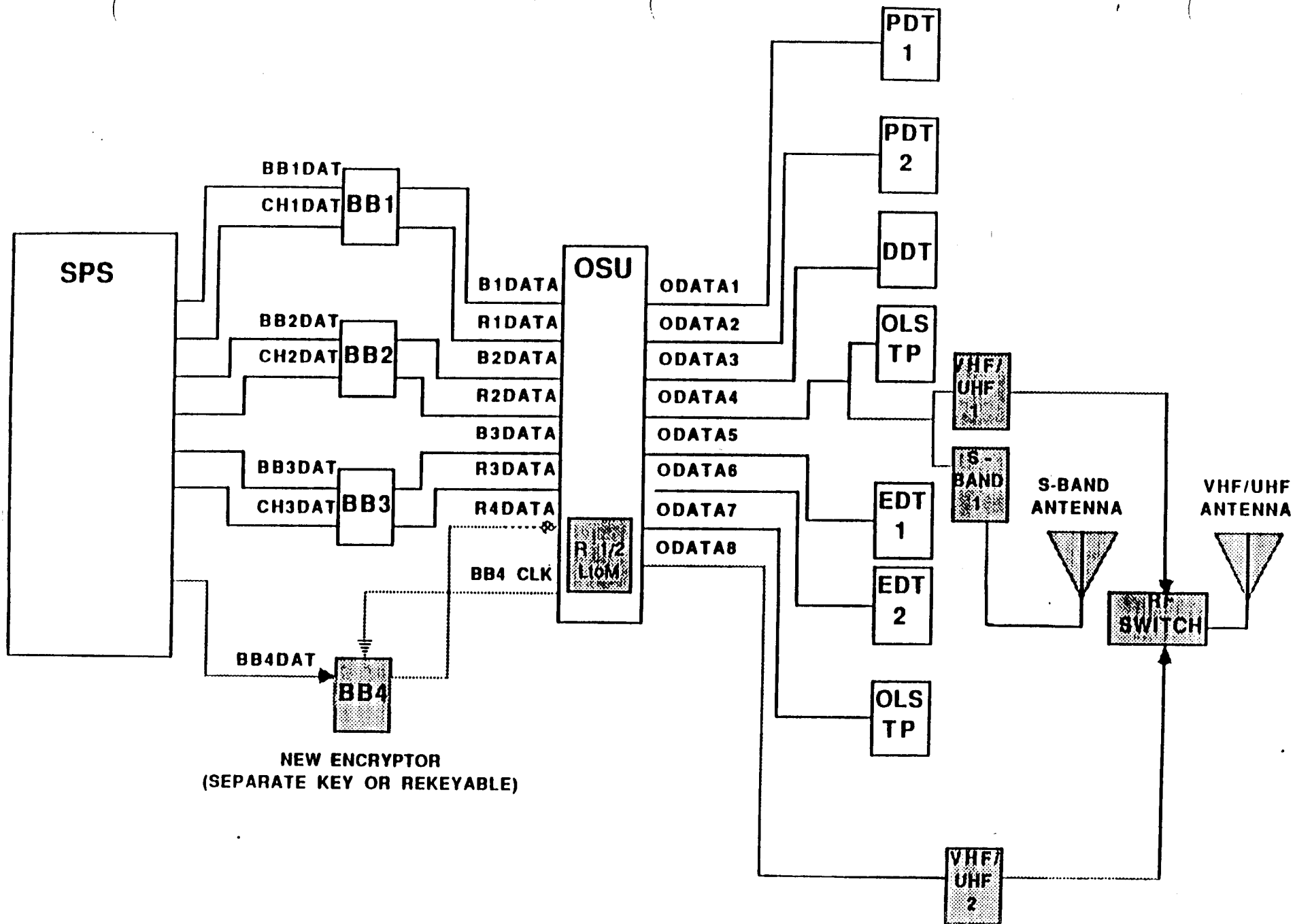Figure 16.3.1-1 Realtime Data Smooth Block Diagram (S16)

Figure 16.3.1-2   Realtime Data Smooth Block Diagram (S17-S20)

frequency between 2200.5 and 2289.5 MHz. This proposal assumes that the allocated carrier frequency will be within this range. A review of the other subassemblies and frequency sensitive components used in the S-band transmitter did not reveal a need for any other design or component changes.

16.3.1.2   S-band Directional Antenna

The proposed S-band antenna is the existing DMSP hardened cross-dipole antenna which is used on Block 5D-3 S15. Engineering Test Model (ETM) testing has shown that this antenna can be tuned to radiate any carrier frequency in the 2200.5-2289.5 MHz range. Tuning is performed by altering the height of the dipole elements above the ground plane.

16.3.1.3   UHF Transmitters

On S17-S20, the RDS data will also be furnished to two functionally redundant UHF transmitters operating at two different carrier frequencies. For the purposes of this proposal, carrier frequencies in the vicinity of 400 MHz have been assumed.

The UHF transmitter will have three major subassemblies: a crystal-controlled oscillator (XCO) to generate the required carrier frequency, a power amplifier to boost the input signal to the required level of 20.0W, and an isolator to negate the effects of harmonics and spurious noise. The XCO and analog phase modulator will be purchased subassemblies.

16.3.1.4   UHF RF Switch

The output of one of the two S17-S20 UHF transmitters (selectable by command) will be routed via an RF switch to a single omnidirectional antenna. The proposed RF switch is presently used on the TIROS spacecraft. The RF switch will be purchased from Transco Products, Inc.

16.3.1.5 UHF Omnidirectional Antenna

The proposed UHF antenna is a hardened version of the TIROS UDA
(UHF Data Collection Antenna). This antenna will be deployed to
its operational position after launch. A transmitter output power
of approximately 20.0W will be required to close the link with
this antenna. The UDA is presently used by TIROS as a receive
antenna and is incapable of handling this output power level in
its present configuration. Redesign of this antenna will be
required for use in the RDS application. Following completion of
the antenna design, antenna pattern testing will be performed to
ensure that antenna gain performance at spacecraft level will meet
link requirements.

16.3.2 Structure Subsystem

16.3.2.1 UHF Antenna Deployment Mechanism

The size and form factor of the UHF antenna dictate a deployment
stage to extend it to its operational position. A stowed location
on the +X side of the truss has been identified. The UHF antenna
will be attached to a hinged boom which will be secured to the
truss using shear ties.

16.3.3 Telemetry Subsystem

The PIP will be modified to expand the number of analog input
channels from 384 to 512. The current PIP design has no spare
analog channels to accommodate telemetry signals from the
additional transmitters and encryption unit. There are sufficient
spare discrete signals. An additional analog multiplexer board
will be added to a spare slot in the PIP container. Analysis of
the existing DC/DC converter shows that this subassembly will
require redesign to increase its capacity to handle the outputs of
the additional multiplexer chips. The PIP container will not need

to be modified, but mechanical and thermal stress analyses will be performed to assess the effects of adding these boards.

A newly designed KG interface board will be added to the slot presently designated for an additional discrete multiplexer board. This new KG interface board will accept and process the serial telemetry stream from the GFE rekeyable encrypter. If telemetry messages from the encrypter are available, they will be inserted into the Command Verification slot in the PIP frame. It is believed that this message traffic will occur only when rekey operations are taking place; thus, no conflict with the normal CV of realtime commands is expected.

The PIP firmware will also be modified to allow processing of the new analog channels. The firmware modifications will be limited to the replacement of the medium time commutated telemetry readout (TCTR) samples with a second set of slow TCTR samples. This second slow TCTR table will be the same size as the original slow TCTR table. This enables processing of the additional 120 analog signals. The frame format will change slightly, since all the medium slots will be replaced with slow slots. The length, timing, and rate of the telemetry frames will not change.
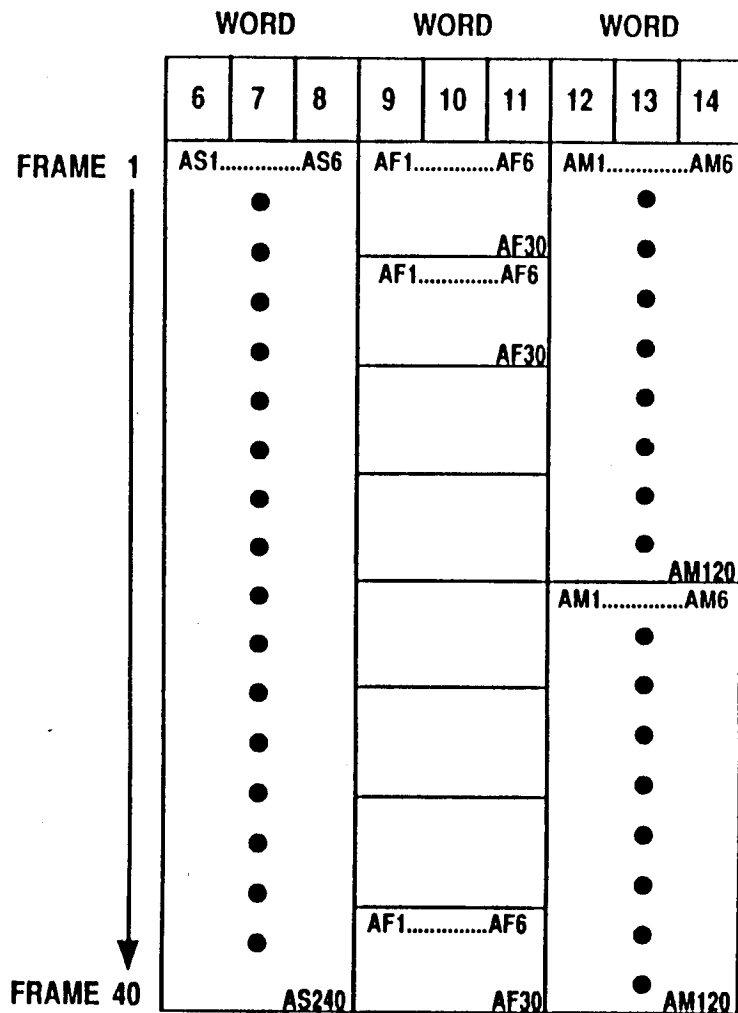
Figures 16.3.3-1 and 16.3.3-2 depict the proposed PIP frame format.

16.3.4 <u>Command and Control Subsystem</u>

This proposal assumes that the Government Furnished Equipment (GFE) BBT4 encrypter will 1) require no serial command interface with the spacecraft, 2) utilize a maximum of four (4) existing CIU Parallel Output Buffer (POB) bits with 0V/+10V logic levels for key indexing functions, and 3) have the same mounting footprint as the KG-46 presently used for downlink telemetry encryption on S9 through S20.
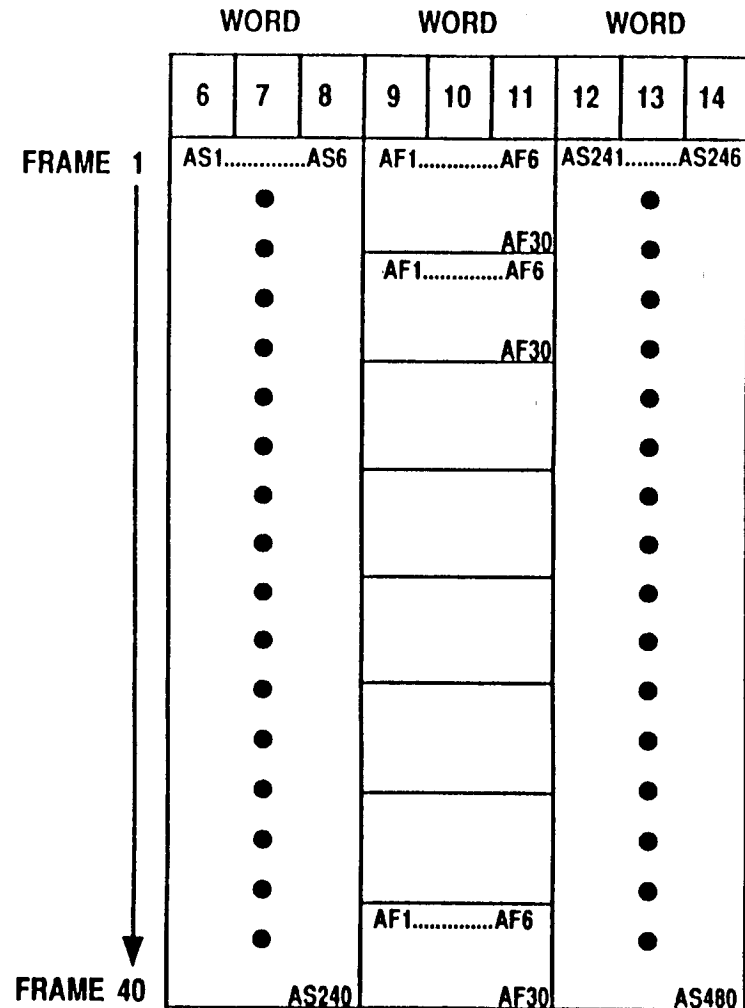
TIME COMMUTATED TELEMETRY READOUT (TCTR)

PRESENT FORMAT

WORD			WORD			WORD		
6	7	8	9	10	11	12	13	14

FRAME 1

AS1..............AS6   AF1..............AF6   AM1..............AM6

AF30

AF1..............AF6

AF30

AM120

AM1..............AM6

AF1..............AF6

FRAME 40   AS240   AF30   AM120

240 SLOW SLOTS SAMPLED 1/SUPERFRAME	30 FAST SLOTS SAMPLED 8/SUPERFRAME	120 MED SLOTS SAMPLED 2/SUPERFRAME

NOTE: SIX CHANNELS ARE OVERSAMPLED BECAUSE THERE ARE 390 SUPERFRAME SLOTS VS. 384 PIP INPUT LINES

PROPOSED FORMAT

WORD			WORD			WORD		
6	7	8	9	10	11	12	13	14

FRAME 1

AS1..............AS6   AF1..............AF6   AS241..........AS246

AF30

AF1..............AF6

AF30

AF1..............AF6

FRAME 40   AS240   AF30   AS480

240 SLOW SLOTS SAMPLED 1/SUPERFRAME	30 FAST SLOTS SAMPLED 8/SUPERFRAME	240 SLOW SLOTS SAMPLED 1/SUPERFRAME

NOTE: TWO CHANNELS CANNOT BE SAMPLED WITHOUT REPROGRAMMING BECAUSE THERE ARE 510 SUPERFRAME SLOTS VS. 512 PIP INPUT LINES

Figure 16.3.3-1 Analog Telemetry Format

DISCRETE TELEMETRY READOUT

PRESENT FORMAT	PROPOSED FORMAT

WORD 31 (PRESENT FORMAT)

MSH	LSH

FRAME 1

PIP STATUS
DISC WD 4
DISC WD 5
DISC WD 6
DISC WD 7
DISC WD 8
DISC WD 9
DISC WD 10
DISC WD 11
DISC WD 12
DISC WD 13
DISC WD 14
DISC WD 15
DISC WD 28
DISC WD 28
DISC WD 28 ⎤
DISC WD 28 ⎥ OLS TIME
DISC WD 28 ⎥ MULTIPLEXED
DISC WD 28 ⎥ DISCRETES
DISC WD 28 ⎥
DISC WD 28 ⎦
DISC WD 4
DISC WD 5
DISC WD 6
DISC WD 7
DISC WD 8
DISC WD 21
DISC WD 22
DISC WD 16
DISC WD 17
DISC WD 18
DISC WD 19
DISC WD 20
DISC WD 24
DISC WD 25
DISC WD 26
DISC WD 27
DISC WD 29
DISC WD 30

FRAME 40   DISC WD 31

WORD 31 (PROPOSED FORMAT)

MSH	LSH

FRAME 1

PIP STATUS
DISC WD 4
DISC WD 5
DISC WD 6
DISC WD 7
DISC WD 8
DISC WD 9
DISC WD 10
DISC WD 11
DISC WD 12
DISC WD 13
DISC WD 14
DISC WD 15
DISC WD 28
DISC WD 28
DISC WD 28 ⎤
DISC WD 28 ⎥ OLS TIME
DISC WD 28 ⎥ MULTIPLEXED
DISC WD 28 ⎥ DISCRETES
DISC WD 28 ⎥
DISC WD 28 ⎦
DISC WD 0
DISC WD 1
DISC WD 2
DISC WD 3
DISC WD 23
DISC WD 21
DISC WD 22
DISC WD 16
DISC WD 17
DISC WD 18
DISC WD 19
DISC WD 20
DISC WD 24
DISC WD 25
DISC WD 26
DISC WD 27
DISC WD 29
DISC WD 30

FRAME 40   DISC WD 31

NOTE: DISCRETE WORDS 4-8 SAMPLED TWICE/SUPERFRAME
DISCRETE WORD 23 IS NOT SAMPLED
DISCRETE WORDS 0-3 SAMPLED IN BOOST MODE ONLY

Figure 16.3.3-2 Discrete Telemetry Format

16.3.5 Harness

The ESM harness will require modifications to provide new connections as follows:

(1) +28V and +5V power to new transmitters
(2) +28V power to new encryption unit and RF switch
(3) Power returns
(4) Telemetry and commands for new units
(5) Data and RF connections between OLS, transmitters, and antennas
(6) Transmitter test points (for spacecraft-level test)

16.3.6 Flight Software

The spacecraft flight software command table, CMDTB, will be augmented to include new commands. In addition, because of the elimination of the medium TCTR samples, the modules PSMON and TMEVS require changes. The PSMON modifications involve minor changes to the CK5VB and BACON subroutines and a redesign of the TRANS subroutine. The TMEVS modifications involve minor changes to the CRCHECK subroutine.

16.3.7 Test Equipment

16.3.7.1 Transmitter and Antenna Special Test Equipment (STE)

The present transmitter STE will require some modification to test the new UHF transmitters. Changes to the STE will involve a plug-in addition to the signal generator to expand the STE frequency range and a new STE interface box. Most of the existing S-band transmitter STE, however, will be compatible with a UHF transmitter.

The existing antenna STE has the capability for antenna test in

the UHF bands; therefore, no antenna STE modifications will be required.

No STE will be required for the RF switch, since this unit is a purchased item.

16.3.7.2   Programmable Information Processor (PIP) Special
           Test Equipment (STE)

The PIP STE will require both hardware and software modifications to test the frame subcom reorganization and the new KG interface function. Changes in the PIP firmware require corresponding changes to the test software written for the processor board in the PIP.

16.3.7.3 Harness Automated Test Equipment (HATS)

The Harness Automated Test Station (HATS) will be modified to incorporate new connectors and additional wires. Additional hardware will be required, and minor modifications to the test software will be necessary.

16.3.7.4   Extended Aerospace Ground Equipment (XAGE)

The XAGE will be modified to include receivers for the new S-band and UHF transmitters.

The telemetry processing software will also require modifications to provide for the proper decommutation of the reorganized PIP stream.

The Atlas test programs and procedures will also be modified to incorporate system-level tests of the RDS link:

16.3.7.5 UHF Antenna Handling Fixture

A handling fixture to support the UHF antenna in its deployed configuration at both unit-level and spacecraft level will be designed and fabricated.

16.4 **Power and Weight Estimates**

16.4.1 S16 Spacecraft

The addition of the RDS link will increase the S16 spacecraft weight and power consumption as listed below:

UNIT	POWER (watts)	WEIGHT (pounds)
S-band Xmtr	27.0	**2.2**
BBT4 ("Ricebird" KG-46 w/key) indexing)	1.4	
S-band Antenna	......	0.65
Harness	....	**2.0**
PIP (delta)	**0.2**	**0.7**
OLS (delta)	0.1	1.0
Total	28.7	6.55

The power estimates are based on a 100% duty cycle. Per Figure 7.3-4 in the 5D-3 System Analysis Report (SAR), the EOL orbit average power margin at 0° sun angle -is 54 Watts; therefore, the additional 28.7 Watts is within the available S16 spacecraft power margin

The additional 6.55 pounds is within the available S16 spacecraft weight margin.

16.4.2 S17-S20 Spacecrafts

The addition of the RDS link will increase the S17-S20 spacecraft weight and power consumption as listed below:

UNIT	POWER (watts)	WEIGHT (pounds)
S-band Xmtr	27.0	2.2
UHF Xmtr 1	60.2	1.0
UHF Xmtr 2	60.2	1.0
BBT4 ("Ricebird" KG-46 w/key indexing)	1.4	
UHF RF Switch	0.2	
S-band Antenna	....	0.65
UHF Antenna	....	
Harness	.....	2.0
PIP (delta)	0.2	0.7
CIU (delta)	.....	0.1
OLS (delta)	0.1	1.0
Total	89.1	13.55

The power estimates are based on a 100% duty cycle. Orbit average power consumption lessens as the duty cycle decreases. Per Figure 7.3-4 in the 5D-3 System Analysis Report (SAR), the EOL orbit average power margin at $0°$ sun angle is 54 Watts. Consequently, duty-cycling of the RDS equipment on S17-S20 will be required for sun angles between 0' and ~ 9' to maintain system energy balance. No modifications to increase Power Subsystem capability are included in this proposal.

The additional 13.55 pounds is within the available S17-S20 spacecraft weight margin.

16.5 Command and Telemetry Additions

The command and telemetry signals needed to monitor and control
the operation of the RDS link are summarized below:

16.5.1   Telemetry Signals

S-band Transmitter output power   (analog)
UHF Transmitter 1 output power   (analog) — S17-S20 only
UHF Transmitter 2 output power   (analog) — S17-S20   o n l y
S-band Transmitter temperature   (analog)
UHF Transmitter 1 temperature   (analog) — S17-S20

                                   -S17-S20   only

S-band Transmitter on/off (discrete)
UHF Transmitter 1 on/off (discrete) — S17-S20 only
UHF Transmitter 2 on/off (discrete) — S17-S20 only
UHF RF switch status (discrete) — S17-S20 only
BBT4 supply voltage (analog)

16.5.2   Commands

16.5.2.1 OLS Commands

S-band Transmitter on   (pulse discrete)
UHF Transmitter 1 on   (pulse discrete) — S17-S20 only
UHF Transmitter 2 on   (pulse discrete) — S17-S20 only

16.5.2.2   CIU Commands

UHF Transmitter to Antenna select (pulse command) — S17-S20 only
BBT4 Key Change (Preset I/O Logical command)

16.6 Frequency Allocation

The assignment of three new carrier frequencies will be required.

Radio frequency assignments are governed by Air Force Regulation (AFR) 700-14. Frequency allocation proposals are submitted to the Space Systems Division Frequency Manager via the Procuring Contracting Officer (PCO), using DD Form 1494 and FCC Form 130. Proposals are then reviewed by the Joint Frequency Panel.

Completed forms for an S-band spaceborne transmitter/ground-based receiver may be found in OLS Realtime Data Smooth Transmission to Small Tactical Terminals Study Final Technical Operating Report. Completed forms for a spaceborne UHF transmitter were included with ECP 71. Submittal of these forms to the Space Systems Division Frequency Manager is the responsibility of the DMSP SPO.

16.7 Testing Requirements

16.7.1 Developmental Testing

The engineering test model (ETM) of the PIP will be modified to include the additional analog multiplexer board. The PIP firmware will be developed, debugged, and validated using the ETM. The ETM will also be used to validate the new STE interfaces (hardware and software).

A one-time antenna pattern test using a full-scale model of the spacecraft front panel will be performed to characterize the radiation patterns of the new antennas.

16.7.2 Qualification Testing

The S-band transmitter and S-band antenna are already designed to accommodate frequencies between 2200.5 and 2289.5 MHz. Engineering test model testing has already shown compatibility of

these designs with frequencies across this band. Consequently requalification of these units is not required and is not proposed.

The RF switch, the UHF transmitter, the UHF antenna, and the Antenna Deployment Mechanism will require qualification testing per the requirements of MIL-STD-154OB.

Because of the addition of the analog multiplexer board and KG interface board to the PIP, and the consequent redesign of the DC/DC converter board, the PIP will be requalified as a major redesign in accordance with the contractually tailored requirements of MIL-STD-154OB.

A Final Qualification Test (FQT) of the redesigned flight load package using the Software Test Facility will be performed, Module-level tests of modules PSMON, TMEVS, and CMDPR to verify changes, will be performed prior to FQT.

16.7.3 Acceptance Testing

Acceptance testing of the flight units, in accordance with the contractually tailored requirements of MIL-STD-1540B, will be performed prior to their integration on the spacecraft.

The spacecraft wire harness will be acceptance tested to the requirements of DOD-W-83575A.

16.7.4 System-Level Testing

The system-level test program will be modified to exercise the link.

Changes to the Initial Power Turn-On (IPTO), Functional Electrical Tests (FETs), System Electrical Performance Evaluation Test (SEPET), Electromagnetic Compatibility Test (EMC), Orbit Test.

Pyro-Shock Test, and Deployment tests will be required.

A one-time-only extended EMI/RFI test will be performed on the S17 spacecraft to ensure that radiated or conducted emissions from the UHF link do not interfere with spacecraft operation.

16.8 Safety Impact Analysis

There will be no impact on system safety as a result of implementing the changes described in this proposal. A calculation of the RF field strength attributable to the UHF antenna will be included in the S16-S20 Accident Risk Assessment Report when information to complete the computation becomes available.

ATTACHMENT 1

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-1

SPECIFICATION CHANGE NOTICE
(SEE MIL-STD-490 FOR INSTRUCTIONS)

DATE PREPARED 11-1-90

1 ORIGINATOR NAME AND ADDRESS		2.	3 CODE IDENT	4 SPECNO
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*		[X] PROPOSED	49671	S-DMSP-895-1
			5 CODE IDENT.	6 SCNNO
		cl APPROVED	49671	003

7 SYSTEM DESIGNATION	6 RELATED ECP NO	9 CONTRACT NO	10. CONTRACTURAL ACTIVITY
DMSP	ECP 71R1	FO4701-89-C-0029	

11 CONFIGURATION ITEM NOMENCLATURE	12 EFFECTIVITY
5D-3 Integrated Spacecraft	5D-3 Spacecraft S-16

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	16b		X	1 Nov 90
	21	X		1 Nov 90
	32	X		1 Nov 90
	33	X		1 Nov 90
	Note: Page xxiv will be supplied with the approved SCN.			

16 TECHNICAL CONCURRENCE	DATE

DD 1 DEC 68 FORM 1696

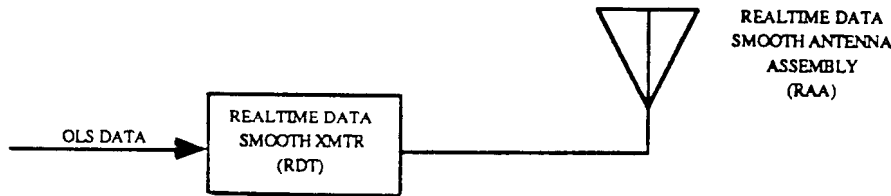*"S" indicates supersedes earlier page. "A" indicates added page.*

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-1
CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Change S-DMSP-895-1 as follows:

1. Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 3,

   a. Change from: "No Change"

   b. Change to: "16a"

2 Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 5,

   a. Change from: "No Change"

   b. Change to: "16b"

3 Page 16a, include Figure 3 from S-DMSP-895 with the following change in the block called "Sensor Payload,":

   a. Change from: "BB (1-3)"

   b. Change to: "BB (1-4)"

4. Page 16b, include Figure 5 from S-DMS?-895 with the following addition in the block called "Communications Group,":

REALTIME DATA
SMOOTH ANTENNA
ASSEMBLY
(RAA)

OLS DATA → REALTIME DATA SMOOTH XMTR (RDT)

5. Page 21, Figure 14. Equipment Tree for Block 5D-3 Spacecraft.

   a. Under the block "Comm Group," add the following blocks: "RDT" and "RAA"

6. Page 32, Paragraph 3.7.1.5.2.1.2, <u>Channels</u>.

   a. Change from: "No change."

   b. Change to: "The telemetry group shall handle as a minimum 512 analog and 256 discrete inputs. It shall accommodate digital status streams from the spacecraft computers and OLS sensor, and memory dumps from each of these as well as from its own memory."

7. Page 33, Paragraph 3.7.1.5.2.3, <u>Communications Group</u>.

   a. Change from: "No change."

   b. Change to: "The communications group shall provide **four** links to accommodate mission data as processed by the OLS sensor in accordance with the requirements of IS-DMSP-887. The communications group shall provide redundant telemetry transmit equipment. The communications group shall include the antennas, filters, combiners, splitters, modulators, demodulators, and transmitters required to meet the link requirements of IS-DMSP-853."

ATTACHMENT 2

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-2

SPECIFICATION CHANGE NOTICE

(SEE ML-STD-490 FOR INSTRUCTIONS)

DATE PREPARED   11-1-90

1. ORIGINATOR NAME AND ADDRESS	2		3 CODE IDENT	4 SPECNO.
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	[X] PROPOSED [ ] APPROVED		49671 5 CODE IDENT 49671	S-DMSP-895-2 6 SCNNO. 003

7 SYSTEM DESIGNATION	6 RELATED ECP NO.	9 CONTRACT NO	10. CONTRACTURAL ACTIVITY
DMSP	ECP 71R1	FO4701-89-C-0029	

11 CONFIGURATION ITEM NOMENCLATURE	12 EFFECTIVITY
5D-3 Integrated Spacecraft	5D-3 Spacecraft S-17

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	16b		x	1 Nov 90
	21	x		1 Nov 90
	32	x		1 Nov 90
	33	x		1 Nov 90

Note: Page xxiv will be supplied

with the approved SCN.

16 TECHNICAL CONCURRENCE	DATE

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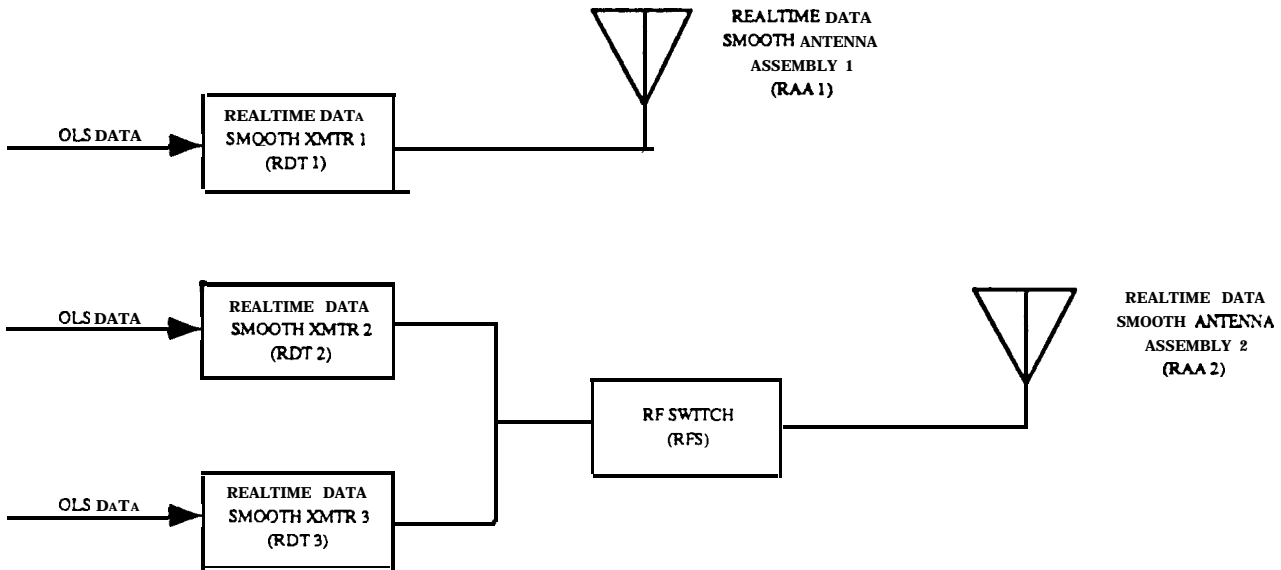
PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-2
CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Chanae S-DMSP-895-2 as follows:

1. Page xxi, FIGURES, in the column under "PAGE," opposite to the
   entry for FIGURE 3,

   a. Change from: "No Change"

   b. Change to: "16a"

2. Page xxi, FIGURES, in the column under "PAGE," opposite to the
   entry for FIGURE 5,

   a. Change from: "No Change"

   b. Change to: "16b"

3. Page 16a, include Figure 3 from S-DMSP-895 with the following
   change in the block called "Sensor Payload,":

   a. Change from: "BB (1-3)"

   b. Change to: "BB (1-4)"

4. Page 16b, include Figure 5 from S-DMSP-895 with the following additions in the block called "Communications Group,":

5. Page 21, Figure 14. Equipment Tree for Block **5D-3** Spacecraft.

    a. Under the block "Comm Group," add the following blocks: "RDT-1," "RDT-2," "RDT-3," "RFS," "RAA-1," and "RAA-2"

6. Page 32, Paragraph 3.7.1.5.2.1.2, <u>Channels</u>.

    a. Change from: "No change."

    b. Change to: "The telemetry group shall handle as a minimum 512 analog and 256 discrete inputs. It shall accommodate digital status streams from the spacecraft computers and OLS sensor, and memory dumps from each of these as well as from its own memory."

7. Page 33, Paragraph 3.7.1.5.2.3, <u>Communications Group</u>.

    a. Change from: "No change."

    b. Change to: "The communications group shall provide **five** links to accommodate mission data as processed by the OLS sensor in accordance with the requirements of IS-DMSP-887. The communications group shall provide redundant telemetry transmit equipment. The communications group shall include the antennas, filters, combiners, splitters,

modulators, demodulators, and transmitters required to meet the link requirements of IS-DMSP-853."

ATTACHMENT 3

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-3

SPECIFICATION CHANGE NOTICE
(SEE MIL-STD-490 FOR INSTRUCTIONS)

DATE PREPARED 11-1-90

1 ORIGINATOR NAME AND ADDRESS	2.	3 CODE IDENT	4 SPECNO
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	[X] PROPOSED [ ] APPROVED	49671	S-DMSP-895-3
		5 CODE IDENT 49671	6 SCNNO 003

7 SYSTEM DESIGNATION DMSP	6 RELATED ECP NO ECP 71R1	9 CONTRACT NO FO4701-89-C-0029	10 CONTRACTURAL ACTIVITY

11 CONFIGURATION ITEM NOMENCLATURE 5D-3 Integrated Spacecraft	12 EFFECTNKY 5D-3 Spacecraft S-18

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	16b		x	1 Nov 90
	21	x		1 Nov 90
	32	x		1 Nov 90
	33	x		1 Nov 90
	Note: Page xxiv will be supplied with the approved SCN.			

16 TECHNICAL CONCURRENCE	DATE

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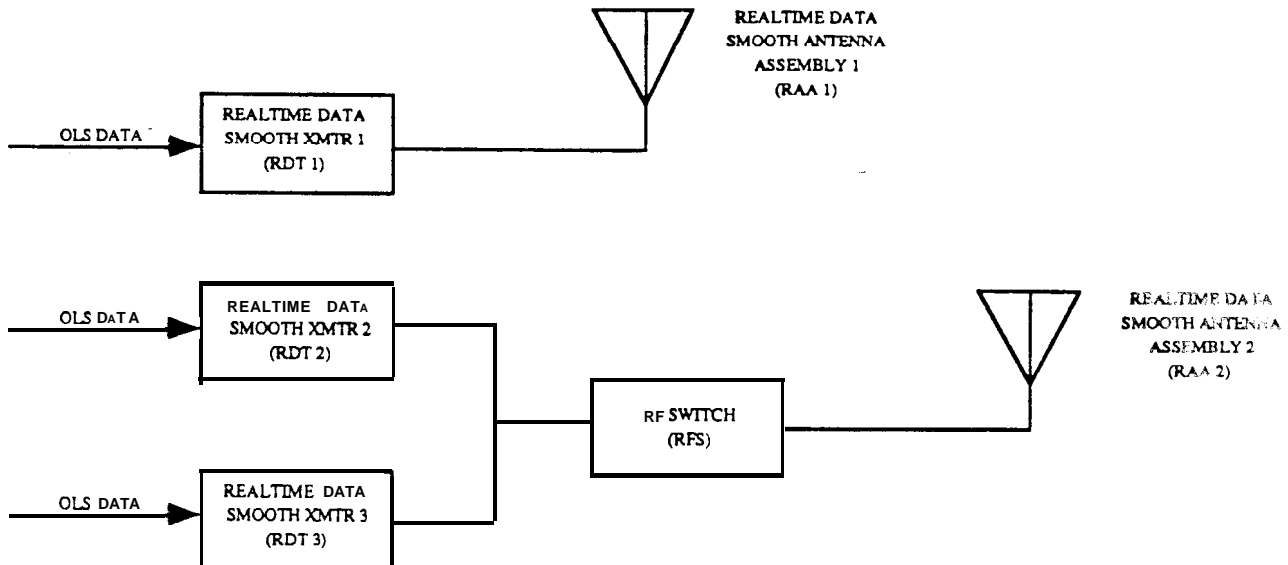*"S" indicates supersedes earlier page. "A" indicates added page.*

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-3
CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Change S-DMSP-895-3 as follows.:

1. Page xxi, FIGURES, in the column under "PAGE," opposite to the
   entry for FIGURE 3,

   a. Change from: "No Change"

   b. Change to: "16a"

2. Page xxi, FIGURES, in the column under "PAGE," opposite to the
   entry for FIGURE 5,

   a. Change from: "No Change"

   b. Change to: "16b"

3. Page 16a, include Figure 3 from S-DMSP-895 with the following
   change in the block called "Sensor Payload,":

   a. Change from: "BB (1-3)"

   b. Change to: "BB (1-4)"

4. Page 16b, include Figure 5 from S-DMSP-895 with the following additions in the block called "Communications Group,":

5. Page 21, Figure 14. Equipment Tree for Block 5D-3 Spacecraft

    a. Under the block "Comm Group," add the following blocks:
"PDT-1," "PDT-2," "RDT-3,""RFS,""RAA-1,"and"RAA-2"

6. Page 32, Paragraph 3.7.1.5.2.1.2, <u>Channels</u>.

    a. Change from: "No change."

    b. Change to: "The telemetry group shall handle as a minimum 512 analog and 256 discrete inputs. It shall accommodate digital status streams from the spacecraft computers and OLS sensor, and memory dumps from each of these as well as from its own memory."

7. Page 33, Paragraph 3.7.1.5.2.3, <u>Communications Group</u>.

    a. Change from: "No change."

    b. Change to: "The communications group shall provide **five** links to accommodate mission data as processed by the OLS sensor in accordance with the requirements of IS-DMSP-887. The communications group shall provide redundant telemetry transmit equipment. The communications group shall include the antennas, filters, combiners, splitters, modulators, demodulators, and transmitters

required to meet the link requirements of
IS-DMSP-853."

ATTACHMENT 4

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-4

SPECIFICATION CHANGE NOTICE
(SEE MIL-STD-490 FOR INSTRUCTIONS)

DATE PREPARED 11-1-90

1 **ORIGINATOR** NAME AND ADDRESS	2.	3 CODE IDENT	4. SPEC NO
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	[X] PROPOSED [ ] APPROVED	49671 CODE IDENT. 49671	S-DMSP-895-4 6. SCNNO 003

7 SYSTEM DESIGNATION 8	RELATED ECP NO	9. CONTRACT NO	10 CONTRACTURAL ACTIVITY
DMSP	ECP 71R	FO4701-89-C-0029	

11 CONFIGURATION ITEM NOMENCLATURE	12 EFFECTIVITY
5D-3 Integrated Spacecraft	5D-3 Spacecraft S-19

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	16b		X	1 Nov 90
	21	X		1 Nov 90
	32	X		1 Nov 90
	33	X		1 Nov 90
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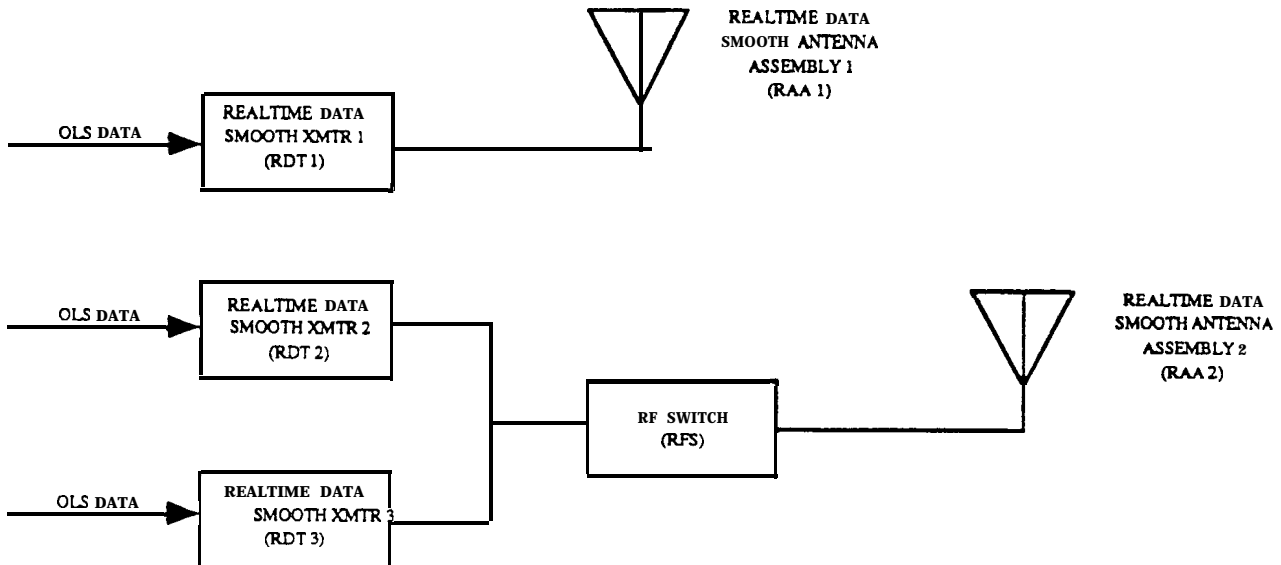
PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-4
CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Change S-DMSP-895-4 as follows:

1. Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 3,

   a. Change from: "No Change"

   b. Change to: "16a"

2. Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 5,

   a. Change from: "No Change"

   b. Change to: "16b"

3. Page 16a, include Figure 3 from S-DMSP-895 with the following change in the block called "Sensor Payload,":

   a. Change from: "BB (1-3)"

   b. Change to: "BB (1-4)"

4. Page 16b, include Figure 5 from S-DMSP-895 with the following additions in the block-called "Communications Group,":

5. Page 21, Figure 14. Equipment Tree for Block 5D-3 Spacecraft.

   a. Under the block "Comm Group," add the following blocks: "RDT-1," "RDT-2," "RDT-3," "RFS," "RAA-1," and "RAA-2"

6. Page 32, Paragraph 3.7.1.5.2.1.2, Channels.

   a. Change from: "No change."

   b. Change to: "The telemetry group shall handle as a minimum 512 analog and 256 discrete inputs. It shall accommodate digital status streams from the spacecraft computers and OLS sensor, and memory dumps from each of these as well as from its own memory."

7. Page 33, Paragraph 3.7.1.5.2.3, Communications Group.

   a. Change from: "No change."

   b. Change to: "The communications group shall provide **five** links to accommodate mission data as processed by the OLS sensor in accordance with the requirements of IS-DMSP-887. The communications group shall provide redundant telemetry transmit equipment. The communications group shall include the antennas, filters, combiners, splitters, modulators, demodulators, and transmitters

required to meet the link requirements of
IS-DMSP-853."

ATTACHMENT 5

PROPOSED SCN-003, DATED 1 NOVEMBER 1990, TO S-DMSP-895-5

SPECIFICATION CHANGE NOTICE
(SEE MIL-STD-490 FOR INSTRUCTIONS)

DATE PREPARED 11-1-90

1. ORIGINATOR NAME AND ADDRESS	2.	3 CODE IDENT	4 SPECNO
GE Astro-Space Division *P.O. Box 800* *Princeton, N J 08543-0800*	[X] PROPOSED	49671	S-DMSP-895-5
	cl APPROVED	5 CODEIDENT 49671	6 SCNNO 003

7 SYSTEM DESIGNATION	6. RELATED ECP NO	9 CONTRACTNO	10 CONTRACTURAL ACTIVITY
DMSP	ECP 71R1	FO4701-89-C-0029	

11. CONFIGURATIONITEM NOMENCLATURE	12 EFFECTIVITY
5D-3 Integrated Spacecraft	5D-3 Spacecraft S-20

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	16b		x	1 Nov 90
	21	x		1 Nov 90
	32	x		1 Nov 90
	33	x		1 Nov 90

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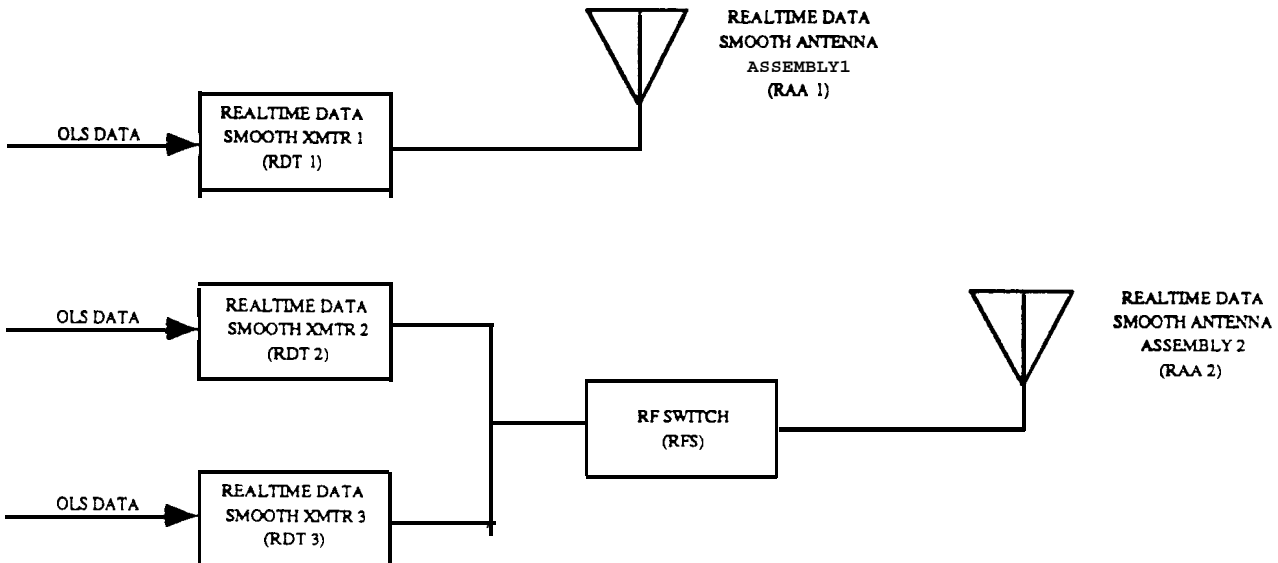CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Chanae S-DMSP-895-5 as follows:

1. Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 3,

   a. Change from: "No Change"

   b. Change to: "16a"

2. Page xxi, FIGURES, in the column under "PAGE," opposite to the entry for FIGURE 5,

   a. Change from: "No Change"

   b. Change to: "16b"

3. Page 16a, include Figure 3 from S-DMSP-895 with the following change in the block called "Sensor Payload,":

   a. Change from: "BB (1-3)"

   b. Change to: "BB (1-4)"

4. Page 16b, include Figure 5 from S-DMSP-895 with the following additions in the block called "Communications Group,":

5. Page 21, Figure 14. Equipment Tree for Block 5D-3 Spacecraft.

 a. Under the block "Comm Group," add the following blocks: "P D T - 1 ,"   "RDT-2," "RDT-3," "RFS," "RAA-1," and "RAA-2"

6. Page 32, Paragraph 3.7.1.5.2.1.2, Channels.

 a. Change from: "No change."

 b. Change to: "The telemetry group shall handle as a minimum 512 analog and 256 discrete inputs. It shall accommodate digital status streams from the spacecraft computers and OLS sensor, and memory dumps from each of these as well as from its own memory."

7. Page 33, Paragraph 3.7.1.5.2.3, Communications Group.

 a. Change from: "No change."

 b. Change to: "The communications group shall provide **five** links to accommodate mission data as processed by the OLS sensor in accordance with the requirements of IS-DMSP-887. The communications group shall provide redundant telemetry transmit equipment. The communications group shall include the antennas, filters, combiners, splitters, modulators, demodulators, and transmitters

ATTACHMENT 6

CHANGE TO CONTRACT F04701-89-C-0029 STATEMENT OF WORK

PROPOSED CHANGES TO THE STATEMENT OF WORK
CONTRACT: F04701-89-C-0029

REALTIME DATA SMOOTH IMPLEMENTATION (S16-S20)

Chancre Attachment 1 to Contract F04701-89-C-0029 as follows:

1. Add paragraph 3.2.4 to contain the following:

   "Provide all design efforts required in order to accommodate
   the Realtime Data Smooth capability."

2. Add paragraph 3.5.3.1 to contain the following:

   "Provide all required Special Test Equipment in order to
   accommodate the Realtime Data Smooth capability."

Change Annex B of Attachment 1 to Contract F04701-89-C-0029 as
follows:

1. Paragraph 3.1.1.1.1

   a. Under the column titled: "S-DMSP-895-1," add the following:

      "SCN-003
      1 Nov 90"

2. Paragraph 3.1.1.1.2

   a. Under the column titled: "S-DMSP-895-2," add the following:

      "SCN-003
      1 Nov 90"

3. Paragraph 3.1.1.1.3.

   a. Under the column titled: "S-DMSP-895-3," add the following:

      "S C N - 0 0 3
      1 Nov 90"

4. Paragraph 3.1.1.1.4

   a. Under the column titled: "S-DMSP-895-4," add the following:

      "SCN-003
      1 Nov 90"

5. Paragraph 3.1.1.1.5

   a. Under the column titled: "S-DMSP-895-5," add the following:

      "SCN-003
      1 Nov 90"

6. Paragraph 3.1.2.4, Tailoring of MIL-STD-1521B

   a. Change first paragraph of tailoring

      from: "Delete paragraphs 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.8..."

      to: "Delete paragraphs 3.1, 3.2, 3.3, 3.6, 3.7, 3.8..."

   b. Add the following after the first paragraph of tailoring:

      "Add the following sentence to paragraph 3.4: "The scope of the Preliminary Design Review shall be limited to modifications to the design as a result of implementing the Realtime Data Smooth capability.""

   c. Change the second paragraph of tailoring

      from: "Add the following sentence to paragraph 3.5: "The scope of the Critical Design Review-shall be limited to modifications to the design from the technical baseline established under the F04701-86-C-0038 contract.""

      to: "Add the following sentence to paragraph 3.5: "The scope of the Critical Design Review shall be limited to modifications to the design from the technical baseline established under the F04701-86-C-0038 contract and as a result of implementing the Realtime Data Smooth capability.""